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First Report of a Tube Anemone, *Cerianthus filiformis* Carlgren, from Korean Waters, Including Comparison of Cnidae in Adults and Planulae

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韓國未記錄種 실꽃말미잘(*Cerianthus filiformis*)의 報告, 成體와 플라눌라 幼生의 刺胞 比較 포함

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摘 要

韓國産 산호충류의 체통분류학적 硏究의 一環으로 1970年부터 1985年까지 韓國 黃海 沿岸에 있는 芍藥島와 黑山島에서 채집된 실꽃말미잘(*Cerianthus filiformis*)을 동정한 결과 韓國未記錄種으로 밝혀졌다. 1985年 4月에 채집된 개체는 몸속에 플라눌라 幼生을 지니고 있었으며, 이들은 다양한 刺胞를 약간 갖고 있었고, 몸밖으로 나온 플라눌라 幼生에서는 보다 분화된 刺胞를 갖고 있었다. 특히 成体에서는 체벽에 있는 刺胞 중 ptychocyst가 棲管 형성에 지주 역할을 함을 볼 수 있었다.

Key words: Systematics, Tube anemones, Korea.

INTRODUTION

The present investigation is an extensive work for the study on Korean Anthozoa. The tube anemones (Ceriantharia) are distributed scarcely along the coasts of Korea, and there has been a lack of knowledge of ceriantharian species.

For the faunal study of Korean cerianthids, the collections of them had been attempted at a lot of localities along the coasts of South Korea during the period from 1970 to 1985, but they were collected only from Jagyag-do and Hŭgsan-do in the Yellow Sea.

Cerianthus filiformis Carlgren, a hitherto unknown species in Korea, is living in a tube of its own construction which is mainly composed of the large nematocysts. The large nematocysts were called

an atrich by Carlgren (1940), Cutress (1955) and Schmidt (1974), but identified as ptychocyst, an entirely new major category of coelenterate organelle, by Mariscal *et al.* (1977). The cnidae terminology follows that given by Carlgren (1940), Mariscal (1974) and Mariscal *et al.* (1977).

The cerianthids were known as protandrous hermaphrodites and fertilization takes place externally (Nyholm, 1943). However, *Cerianthus filiformis* collected from Jagyag-do in April, 1985, had planulae with ciliated surface in the body. From the comparison of planulae with adults, the author intended to examine the difference of the cnidae which play an important role in the identification of the species of anemones.

MATERIALS AND METHODS

Materials consisted of five specimens from Jagyag-do and one specimen from Hŭgsan-do in the Yellow Sea during the period from 1970 to 1985. Cerianthids buried into sandy mud were mainly collected by the author from the low intertidal zone, and one specimen from Hŭgsan-do was obtained with a trawl.

For the identification, cerianthids were cultured in a low temperature incubator (Shel-Lab., Model #55) for 15 days. Prior to fixation, data on size, shape, color and ejecting of planulae were obtained. The examination of cnidae and the histological studies were conducted by the same methods in the previous paper (Song, 1984).

Cerianthus filiformis newly known in Korea was described with figures and plate figures. The cnidae and planulae were measured with an ocular micrometer. The specimens are deposited in Natural History Museum, Ewha Womans University.

RESULTS

Phylum Cnidaria Hatschek, 1888 자포동물 문
Class Anthozoa Ehrenberg, 1834 산호충 강
Subclass Hexacorallia Gotte, 1902 육방산호 아강
Order Ceriantharia Perrier, 1893 꽃말미잘 목
Family Cerianthidae Milne-Edwards & Haime, 1851 꽃말미잘 과
Genus *Cerianthus* St. Delle Chiaje, 1832 꽃말미잘 속

Cerianthus filiformis Carlgren, 1924 실꽃말미잘 (Pl. 1, fig. 1; Pl. 2, figs. 1-2)

Cerianthus filiformis Carlgren, 1924, (pp. 169-173, text-figs. 1-3); Uchida, 1968, (p. 199, text-fig. 184).
Cerianthus misakiensis Nakamoto, 1923, (pp. 167-172, text-figs. 1-9).

Material examined: Three specimens, Jagyag-do, June 6, 1970 (B. J. Rho); One sp., Jagyag-do, April 18, 1984 (J. I. Song); Two sps., Jagyag-do, May 4, 1985 (J. I. Song); One sp., Hŭgsan-do, May 9, 1985 (J.G. Jae).

External features: Solitary, lacking skeleton. The tube anemone with an elongate column is vertically buried in soft sediment to the level of the oral disk. The aboral end lacks a pedal disk and possesses a terminal pore. The oral disk has simple slender tentacles arranged in two sets, an outer marginal set and an inner labial set. The feltlike tube is formed of hardened slimy secretion in which

are embedded shed cnidae, sand grains and other foreign objects.

Measurement.

Length of column	42–107mm
Width of column	6– 9mm
Length of marginal tentacles	8– 15mm
Length of labial tentacles	4– 6mm
No. of marginal tentacles	53– 74
No. of labial tentacles	56– 71
Length of actinopharynx	9– 16mm

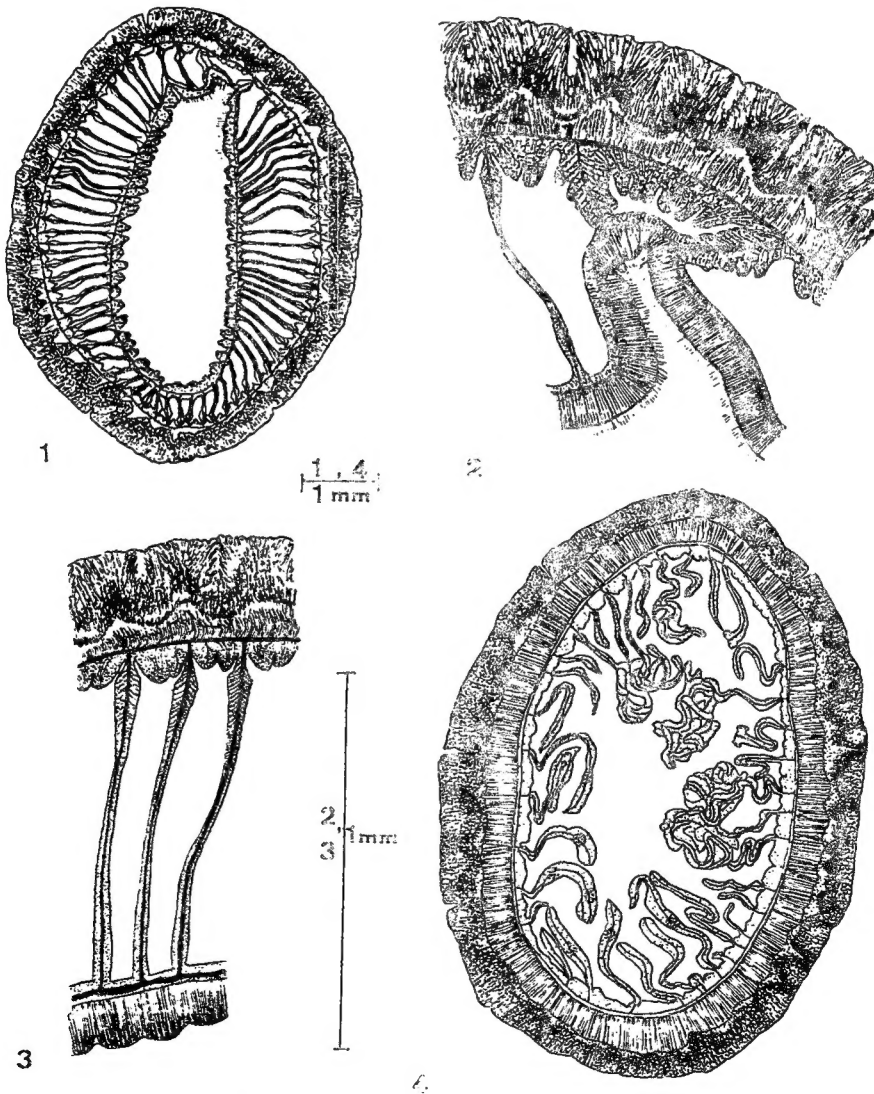

Fig. 1. Cross section through the actinopharynx.

Fig. 2. A siphonoglyph with directives (dm) and a protomesentery (p2), through the actinopharynx.

Fig. 3. Three metamesenteries (M, m, B), through the actinopharynx.

Fig. 4. Cross section below the actinopharynx.

Length of tube 160–265mm
Width of tube 17– 28mm

Mesenteries and internal anatomy: Mesenteries complete, coupled but unpaired, in a single cycle. The number of mesenteries is indefinite, since new couples are added only in dorsal intermesenterial space. The actinopharynx is laterally flattened, bears one siphonoglyph, and the mesenteries lack retractor muscles. Among three most dorsal couples, directive mesenteries (dm) are attached to the narrow siphonoglyph, and the two protomesenteries (p2, p3) are in the either side of them. The dm short, and p2 fertile, reaching almost to the aboral end, but shorter than the oldest M1 and m1. Most of the mesenteries (p2, M, m) reach to the aboral end, and are shown a gradual decrease in the length from dorsal to vental sides. The arrangement of the quartettes MBmb is tend to mBMb. Free parts of the metamesenteries B and b are somewhat longer than the actinopharynx. All mesenteries except the directives bear ciliated tracts which are type 2, and a long craspedoneme next to the cnidoglandular tract. The sphincter muscle is lacking. The column wall is consisted of a well-developed longitudinal epidermal muscle layer, a subepidermal nerve plexus, a longitudinal muscle layer of mesogloea, a thin layer of gastrodermal circular muscles and a gastrodermal muscle layer.

Planulae: The gonads develop on the odd-numbered metamesentery. Tube anemones appear to be protandrous hermaphrodites and fertilization takes place externally. But the tube anemone collected from Jagyag-do in April, 1985, had planulae with ciliated surface in the body. They are 0.51 × 0.50 – 0.71 × 0.54 mm, milky white in color, and ovoid to pear-shaped (Pl. 1, figs. 2-4). After the adult was cultured in a low temperature incubator, the oval larvae were expelled to the outside every day from four days and began to swim spirally in the container. They are 0.48 × 0.43 – 0.90 × 0.42mm, the oral end becoming flattened and slightly concave while the aboral end narrows (Pl. 1, fig. 5).

Difference of cnidae:

Cnidom of adult (Pl. 2, figs. 3-5, 7).

1) spirocysts 2) microbasic b-mastigophors 3) ptychocysts 4) holotrichs

Distribution and size of nematocysts.

Marginal tentacle
- Spirocysts ..... 13-32 × 3-6 μ
- Microbasic b-mastigophors ..... 24-27 × 4-5 μ, 24-36 × 7-8 μ
- Ptychocysts (rare) ..... 34-55 × 12-19 μ

Labial tentacle
- Spirocysts ..... 24-30 × 4-6μ
- Microbasic b-mastigophors ..... 22-26 × 4-5μ, 28-33 × 7-8μ
- Ptychocysts (rare) ..... 30-46 × 11-15 μ

Actinopharynx
- Spirocysts ..... 16-33 × 3-6 μ
- Microbasic b-mastigophors ..... 21-23 × 4-5 μ, 24-39 × 6-9 μ
- Ptychocysts ..... 23-39 × 7-10 μ

Filament
- Spirocysts ..... 22-30 × 3-6 μ

Microbasic b-mastigophors ..... 20-23 × 4-5 μ,
23-37 × 6-8 μ
Ptychocysts ..... 43-57 × 11-15 μ,
20-22 × 4-5 μ

Column
Microbasic b-mastigophors ..... 22-26 × 5-6 μ
Ptychocysts ..... 54-87 × 23-36 μ,
21-35 × 10-17 μ,
18-22 × 6 μ
Holotrichs ..... 27-52 × 9-17 μ

Cnidom of planula at two days after shedding (Pl. 1, figs. 6-9).

1) spirocysts 2) microbasic b-mastigophors 3) ptychocysts

Distribution and size of nematocysts.

Spirocysts ..... 17-36 × 4-6 μ
Microbasic b-mastigophors ..... 14-34 × 4-7 μ
Ptychocysts ..... 22-73 × 10-20 μ

Cnidom of Tube (Pl. 2, fig. 6).

Only ptychocysts

Ptychocysts ..... 7-36 × 2-16 μ

Coloration: The column is some shade of brown varying from pale brown to gray brown. Marginal tentacles and labial tentacles are light brown. The base of marginal tentacles, oral disk and oral aperture are reddish brown or purplish brown.

Habitat: This species occurs scarcely in sandy mud of low intertidal zone (Pl. 2, fig. 2). Because of the lack of a sphincter, the anterior end can't be retracted into the tube. It is negative to gravity, and more or less negative to light.

Distribution: Korea (Yellow Sea), Japan (Misaki-Kyushu).

DISCUSSION

Cerianthus misakiensis wasn't mentioned in any papers after Nakamoto introduced the species in 1923, and Uchida (1968) dealt the species with a synonymy. Carlgren's original description and Nakamoto's description agree in general with what has been found for specimens collected from the Yellow Sea, except for the differences in size and coloration. The study of the cnidae which plays an important role in the identification of the species was not reported by Nakamoto, and given in the actinopharynx and the cnidoglandular tract by Carlgren. The present study had added data regarding the cnidae of planulae, adults and tubes.

Tube anemones appear to be protandrous hermaphrodites and fertilization takes place externally. However, *Cerianthus filiformis* collected in April, 1985, had ovoid to pear-shaped planulae in the body. The larvae had a few cnidae, but as they were growing up, the cnidae were differentiated in the ectoderm of them. Planulae at two days after shedding had three types of cnidae, namely spirocysts, microbasic b-mastigophors and ptychocysts, but adults added holotrichs in the column. The tube was formed of hardened slimy secretion in which was embedded mostly shed cnidae, ptychocysts.

Carlgren and Nakamoto mentioned *Phoronis australis* is found commonly in the tubes of this species, but the animal didn't occur in the present study.

ABSTRACT

The tube anemones were collected from Jagyag-do and Hŭgsan-do in the Yellow Sea during the period from 1970 to 1985. *Cerianthus filiformis* identified in the present study is new to the Korean fauna. This species collected in April, 1985, had planulae in the body, and as the larvae were growing up, cnidae were differentiated in the ectoderm. The tube was formed mostly shed cnidae, ptychocysts in the column.

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EXPLANATION OF PLATES 1-2

(Scale = 1 cm)

PLATE 1

Fig. 1. *Cerianthus filiformis* in process of secreting new tube.

Figs. 2-4. Planulae in the body of adult.

Fig. 5. Planula at two days after shedding.

Fig. 6. Spirocyst of planula.

Fig. 7. Microbasic b-mastigophor of planula.

Fig. 8. Discharged microbasic b-mastigophor of planula.

Fig. 9. Ptychocyst of planula.

PLATE 2

Fig. 1. *Cerianthus filiformis* and its tube.

Fig. 2. *Cerianthus filiformis* buried in sandy mud, showing the tip of tube.

Fig. 3. Spirocyst from actinopharynx of adult.

Fig. 4. Microbasic b-mastigophor and ptychocyst from actinopharynx of adult.

Fig. 5. Discharged microbasic b-mastigophor from labial tentacle of adult.

Fig. 6. Two fully discharged and one undischarged ptychocyst of tube.

Fig. 7. Discharged holotrich from column of adult.

PLATE 1

PLATE 2